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NORTH AMERICAN SPECIES OF TARAXACUM[1]

CONTRIBUTIONS FROM THE HULL BOTANICAL LABORATORY 272

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(WITH PLATES XXXI–XXXIII)

For many years our knowledge of the American species of *Taraxacum* has been in a very imperfect and chaotic state. The perusal of the more prominent manuals and floras issued in the United States during the past few decades shows a surprising confusion of forms and multiplicity of specific names. This confusion is easily accounted for by the fact that most of the *Taraxacum* forms tend strongly to intergrade, so much so that many botanists in the past have despaired of their specific segregation. Thus TORREY and GRAY (Fl. N. Amer. **2**:494. 1843), after describing *Taraxacum dens-leonis* (=*T. vulgare*), wrote as an introduction to their four additional species: "The following species (the characters of which we copy from chiefly DE CANDOLLE, who keeps them distinct), as well as nearly all the genuine *Taraxaca*, are not improbably

[1] Including the West Indies, but not Greenland. The large number of new species recently proposed for Greenland by DAHLSTEDT have made it inadvisable to include the Greenland plants until a more abundant supply of Greenland material can be obtained for detailed study. So far, however, I have examined no plants from Greenland that were not clearly referable either to those species included in this treatment or to *Taraxacum nivale* Lange, a species close to *T. lyratum* but differing in having the achenes glabrous or nearly so. From a study of DAHLSTEDT'S work (Archiv f. Botanik 4^8:1–41. 1905; *ibid.*, 5^9:1–44. 1906) and those of his determinations accessible to me, it appears that his "new species" are mostly synonymous with *Taraxacum lyratum*, *T. nivale*, and *T. ceratophorum*.

correctly viewed by FRIES, KOCH, and other excellent botanists, as mere varieties of this, the *Common Dandelion*."[2] At a later date we find that GRAY himself (Synopt. Fl. N. Amer. 1²:440. 1884) had come to regard all the continental North American forms as representing varieties of but one species, which he stated to be a "very polymorphous species."

In 1907 there appeared the classic monograph of *Taraxacum* by HANDEL-MAZZETTI. This author, evidently impressed with the desultory treatment which the genus usually had been accorded in previous studies, quoted the relevant words of REICHENBACH (Fl. Germ. Excurs. 270. 1830–1832), which are here translated: "A genus seriously forsaken heretofore, because of the negligence of writers. A positively tedious comparison of leaves, without the remaining points having been carefully investigated and clearly set forth, renders the amateurs fully as confused as are the botanists themselves. Moreover, the fruits especially must be observed, and these only in their mature state."

In HANDEL-MAZZETTI'S work there was given an admirable presentation of the various species of the genus. Even this valuable monograph, however, was rather inadequate for a critical opinion of the North American species, since there were a number of the more recently proposed species of which he obviously had not seen authentic specimens. In certain other cases his examination of American specimens was too limited, and I fail to find even the slightest mention of some of the species proposed by American authors previous to 1907. What seems worst of all, however, is that the many valid results of his research have been passed by almost unnoticed until the present day in this country. Taxonomic literature relating to *Taraxacum* in America is still weighted with inaccuracies that ought to be corrected.

The study presented herewith was undertaken in 1918. From the beginning the main purpose has been to correlate much of the material in American herbaria with HANDEL-MAZZETTI'S treatment, to corroborate his results where possible, to correct or improve and to augment where there was need, and then to present

[2] For reference to the works of FRIES, KOCH, and VOITH, touching this point, see DC. Prodr. 7:145 (footnote). 1838.

the conclusions for their easier accessibility to American students. The full generic description given by HANDEL-MAZZETTI is omitted, nor has it been attempted to repeat his extensive lists of synonyms in full. Only such synonyms are given as seem vital or as were misplaced or overlooked by him. For the sake of comparisons, however, his excellent specific descriptions have been followed closely; in the main, only such alterations have been made as considerations of brevity or accuracy would dictate.

Since the completion of my research there has appeared the recent article by STORK (Bull. Torr. Bot. Club **47**: 199–210. *pls. 6, 7.* 1920). It contains interesting data concerning sexuality, variation, and cytological aspects of certain American species, and cites several references that must be omitted here.

As may be noted in the following pages, I have found no occasion for proposing a single new species. In fact the literature of the genus has suffered seriously in the past from the persistent and repeated proposal of ill-advised and scantily considered specific names, many of them founded upon freakish or even immature material. Rather have I been compelled to reduce three species retained by HANDEL-MAZZETTI (*T. phymatocarpum*, *T. mexicanum*, and *T. lapponicum*) to synonomy, thus giving a total of only five species in our range.

Most of the work was prosecuted in the Herbarium of Field Museum, where I was afforded the fullest measure of freedom and courtesy through the kindness of the Curator, Dr. CHARLES F. MILLSPAUGH. The entire collections of *Taraxacum* in the United States National Herbarium, especially rich in specimens from Alaska and the Arctic regions, were loaned through the generosity of the Associate Curator, Mr. WILLIAM R. MAXON. All of the highly important materials in the Herbarium of the Canadian Geological Survey were loaned by Professor JAMES M. MACOUN, late of that Herbarium. Among these were a vast number of valuable specimens from western Canada and the Arctic regions. All of the nearly 800 specimens in the Herbarium of Boissier and the Herbarium of the Institut de Botanique, Geneva, were loaned by Dr. R. CHODAT. These, while mostly from Europe, Asia, and elsewhere than from North America, were of the greatest value in

promoting a better evaluation of the North American species. On two occasions I was permitted by Dr. JULIUS NIEUWLAND to study freely the specimens, several of them types, in the Greene Herbarium at the University of Notre Dame. To all of these botanists I here express my great indebtedness and gratitude. Others to whom also I am grateful for assistance rendered are: Dr. N. L. BRITTON, Director of the New York Botanical Garden; Dr. J. M. GREENMAN, Curator of the Herbarium, Missouri Botanical Garden; Dr. AVEN NELSON, President, University of Wyoming; Professor W. W. ROWLEE, Cornell University; Professor D. B. SWINGLE, Botanist and Bacteriologist, Montana Agricultural Experiment Station.

Abbreviations used for Herbaria: Hb. Boiss., Herb. Boissier; Hb. Can., Herb. Canadian Geological Survey; Hb. Chi., Herb. University of Chicago; Hb. Field, Herb. Field Museum of Natural History; Hb. N.Y., Herb. New York Botanical Garden; Hb. U.S., United States National Hebarium.

Clavis specierum

Achaenia matura rubescentia
- Folia plerumque gracilia, profunde laciniato-pinnatifida; involucri foliola exteriora plerumque patentia vel etiam recurvata.....5. *T. laevigatum*
- Folia crassiora, minus profunde pinnatifida vel etiam integra; involucri foliola exteriora plerumque adpressa.....3. *T. eriophorum*

Achaenia matura non (nisi interdum versus apicem in num. 1) rubescentia
- Achaenia matura nigrescentia (vel interdum versus apicem rubescentia) 1. *T. lyratum*
- Achaenia matura aliusmodi
  - Involucri foliola plerumque adpressa et corniculis instructa 2. *T. ceratophorum*
  - Involucri foliola ecorniculata vel raro corniculis minimis instructa, exteriora patentia vel reflexa.....4. *T. vulgare*

1. TARAXACUM LYRATUM (Led.) DC., Prodr. **7**:148. 1838; *Leontodon lyratus* Ledebour, Icon. Pl. Fl. Ross. ill. **5**:27. *pl. 497*. 1834; Fl. Altaica **4**:152. 1833; *T. phymatocarpum* Vahl, Fl. Danica **13** (fasc. 39):6. *pl. 2298*. 1840; Watson, U.S. Geol. Explor. 40th Parallel 207. 1871; *T. laevigatum* Gray, Proc. Acad. Phil. 1863, p. 70 (non Willd.); *T. officinale* var. *scopulorum* Gray, Synopt. Fl. N. Amer. 1^2:440. 1884; *T. Taraxacum* var. *scopulorum* Heller,

Cat. N. Amer. *pl. 8.* 1898; *T. scopulorum* Rydb., Mem. N.Y. Bot. Gard. **1**:455. 1900; *T. rupestre* Greene, Pittonia **4**:229. (Jan.) 1901; *T. alaskanum* Rydb., Bull. Torr. Bot. Club **28**:512. (Sept.) 1901; *T. hyperoreum* Dahlst., Videsk.-Selsk. Christ. Math.-Naturv. Kl. 1909: no. 8. p. 26. 1910; *T. eurylepium* Dahlst., *loc. cit.* 72; *T. fasciculatum* Nels., Bot. Gaz. **56**:71. 1913 (ex descript. et altitudine); *Leontodon rupestre* Rydb., Fl. Rocky Mts., 1035. 1917; *L. scopulorum* Rydb., *loc. cit.*—Pl. XXXI.

Herba valde variabilis, pusilla (interdum minima), 2–15 (–25) cm. alta. Radix tenuiuscula vel crassa, simplex vel multiceps, collo subsquamato vel foliorum vetustorum fragmentis persistentibus squamato, glabro vel sparse piloso vel sparse longo lanuginoso. Folia suberecta vel patentia, tenuia, glabra, lanceolata vel spathulata, 3–15 mm. lata, infra saepe longe attenuata, nunc integra, nunc denticulata vel sinuato-dentata, nunc regulariter incisa, lobis triangularibus vel lanceolatis, acutis vel obtusis, integris vel subdenticulatis, subrecurvis vel patentibus. Scapi plerumque pauci vel singuli, tenues, glabri vel iuveniles sub capitulo densiuscule villosi, florendi tempore foliis breviores vel multo longiores. Capitula minima (circum 7–12 mm. longa nec latiora) vel maiora (circum 12–18 mm. longa et paulo latiora). Involucri foliola pauca, atroviridiora vel nigricantia, ecorniculata vel corniculis parvis saepe instructa; exterioris seriei foliola adpressa vel laxe adcumbentia, interiorum angustiorum longitudinis 0.4–0.5 attingentia, infima vix breviora, omnia latius angustiusve ovata (latitudine 0.5–1.5 longiora), margine decolorato variabili vel nullo. Flores pauci vel numerosi, sulphurei vel flavi, involucro 1–4 mm. longiores. Achaenia maiuscula, ad 5 mm. longa, atra, fere nigra (versus apicem saepe subrubida), iuniora brunnea, tota rugosa, tuberculis largis, supra longioribus, crassis tenuioribusve obsita, abrupte in cuspidem crasse cylindricam, sulcatam, brevem vel brevissimam, totius fructus septimam partem aequantem vel quintam vix superantem contracta. Rostrum strictum, achaenio subaequilongum. Pappus illo paulo longior, albus.

DISTRIBUTION.—Greenland, Arctic America, and northeastern Asia, southward at alpine heights along the mountains of western Canada and the western United States to Arizona.

SPECIMENS EXAMINED.—Alaska (and neighboring islands): Hall Island, July 14, 1899, *Brewer* and *Coe* 427 (Hb. Greene 30831); Point Gustavus, Glacier Bay, June 10–12, 1899, *Coville* and *Kearney* 732 (Hb. U.S. 376695); Haenke Island, Disenchantment Bay, June 22, 1899, *iidem* 1097 (Hb. U.S. 376702); St. Matthew Island, Bering Sea, July 15, 1899, *iidem* 2164 (Hb. U.S. 376718); Bennet, July 31, 1907, *Henry C. Cowles* 1005 (Hb. Field 419544); Clifton Point, Dolphin-Union Straits (lat. 69° 13′N.), in 1916, Rev. *H. Girling* (Hb. Can. 99071); Herald Isl., Arctic Ocean, in 1881, *Capt. C. L. Hooper* (Hb. U.S. 424060); Wollaston Land (lat. 69–70° N., long. 115° W.), July 1915, *D. Jenness* 415 (Hb. Can. 98711); Camden Bay (lat. 70° N., long. 145° W.), Collinson Point, July 17, 1914, *Frits Johansen* 115 (Hb. Can. no 98716 in Hb. Field 483378); Bernard Harbor (lat. 68° 47′ N., long. 114° 46′ W.), August 1914, *idem* 276 (Hb. Can. 98715); Cape Bathurst (lat. 70° 35′ N., long. 128° 6′ W.), July 1916, *idem* 508 (Hb. Can. 98713); Popof Isl., Shumagin Isls., July 14, 1899, *Trevor Kincaid* (Hb. U.S. 376796); Muir Glacier, July 8–19, 1899, *idem* (Hb. U.S. 376795, peculiar form with foliage of the *T. alaskanum* form and with achenes brown as in *T. ceratophorum*); Point Barrow (lat. 71° N.), steep side bank facing the ocean, July 23, 1898, *E. A. McIlhenny* (Hb. N.Y.; Hb. Can. 26283; type and cotype of *T. alaskanum* Rydb.); Point Barrow, in 1883, *Dr. John Murdoch* (Hb. U.S. 424062, 424063, and 424064, topotypes of *T. alaskanum* Rydb.); Kadiak Isl, vicinity of Karluk, July 5, 1903, *Cloudsley Rutter* 197 (Hb. U.S. 420615, the form matching LEDEBOUR's type illustration very closely); vicinity of Port Clarence, Teller Reindeer Station, tundra banks near beach July 20, 1901, *F. A. Walpole* 1492 (Hb. U.S. 378605), August 9, 1901, *idem* 1791 (Hb. U.S. 378905), and September 4, 1901, *idem* 1987 and 1988 (Hb. U.S. 379107 and 379108 respectively); vicinity of Port Clarence, banks along streams, flat west end of Tasuk Lagoon, August 22, 1901, *idem* 1895 (Hb. U.S. 379011); Arakamtchetchene Isl., Bering Staits, *C. Wright* in 1853–1856 (Hb. U.S. 424059).

British Columbia: West Summit of S. Kootenay Pass, mountain slopes, July 26, 1883, *Dawson* (Hb. Can. 15115); Chilliwhack River, alt. 6000 ft., rocky slopes, August 29, 1901, *J. M. Macoun* (Hb. Can. 26811); Hazelton, Skeena River, mountains, alt. 4500 ft., July 13, 1917, *idem* (Hb. Can. 98703; Hb. Field 483397); second summit west of Skagit River, July 24, 1905, *idem* (Hb. Can. 77001); Cascade Range, near head of McGillivray Creek, alt. 6500 ft., August 12, 1916, *idem* (Hb. Can. 98701; Hb. Field 483396); Mt. Queest, alt. 6000 ft., crevices of rocks, July 25, 1889, *idem* (Hb. Can. 15111; type of *T. rupestre* Greene); Kicking Horse Lake, alt. 8000 ft., alpine slopes, August 14, 1890, *idem* (Hb. Can. 11114; Hb. U.S. 219543); Kicking Horse Lake, damp open thickets, July 28, 1885, *John Macoun* (Hb. Can., 15110); Avalanche Mt., Selkirk Mts., alt. 8000 ft., August 4, 1890, *idem* (Hb. Can., *sine num.*); Revelstoke, alt. 1600 ft., July 26, 1905, *C. H. Shaw* 1008 (Hb. U.S. 621912); Tete Jaune Cache, headwaters of Fraser River, mountain summits, August 31, 1898, *W. Spreadborough* (Hb. Can. 19743).

Alberta: Below and at Ottertail Pass (Rocky Mt. Nat. Park), alt. 6900 ft., August 10, 1904, *John Macoun* (Hb. Can. 65620; Hb. Field 222849); Crow Nest Pass, mountain slopes, alt. 7000 ft., August 6, 1897, *idem* (Hb. Can. 23109); Fitzhugh Mt., Jasper Park, alpine summits, alt. 7000 ft., August 8, 1917, *J. M. Macoun* (Hb. Can. 98682, 98683 and 98684; Hb. Field 483384); Shovel Pass, Jasper Park, high slopes and summits, alt. 7000 ft., August 10, 1918, *idem* (Hb. Can. 98679; Hb. Field 483381); Shovel Pass, Jasper Park, among rocks at foot of cliff, alt. 6000 ft., August 17, 1918, *idem* (Hb. Can. 98680; Hb. Field 483382); Goat Mt., Jasper Park, above tree limit, alt. 7000 ft., July 18, 1918, *idem* (Hb. Can. 98681; Hb. Field 483383); Mt. Edith Cavell, Jasper Park, damp flat, alt. 6000 ft., *idem* (Hb. Can. 98690; Hb. Field 483389).

Montana: Old Hollowtop, near Pony, July 9, 1897, alt. 9000 ft., *Rydberg* and *Bessey* 5294 (Hb. U.S. 361402); above Stanton Lake, alt. 7000–7500 ft., August 1–7, 1894, *R. S. Williams* 1073 (Hb. Greene 48454; Hb. U.S. 288541).

Wyoming: Big Horn Mountains, alt. 10000 ft., July 17, 1890, anonymous (Hb. Greene 48456); without locality, *F. Tweedy* 745 pro parte (Hb. U.S. 41953).

Colorado: Mt. Hesperus, alt. 11000 ft., July 2, 1898, *Baker, Earle,* and *Tracy* 293 (Hb. Field 76097; Hb. Chi. 356356; Hb. U.S. 337212); Saguache (Sawatch) Range, alt. 12000 ft., August 1880, *T. S. Brandegee* (Hb. Field 204736); Uncompahgre River, mountain slopes, alt. 12000–13000 ft., August 1893, *C. A. Purpus* 719 (Hb. Chi. 357798).

Utah: La Sal Mts., alt. 3000–3300 m., July 7, 1911, *Rydberg* and *Garrett* 8720 (Hb. Can. 85360; Hb. U.S. 765075); Uintah Mts., above Bear River, alt. 12000 ft., August 1869, *Sereno Watson* 724 (Hb. U.S. 41943).

Nevada: Rocky Mountains, July 20, 1896, *Edward L. Greene* (Hb. Greene 48455).

Arizona: San Francisco Mts., August 27, 1889, *F. H. Knowlton* 142 (Hb. U.S. 41949).

LEDEBOUR founded his species upon Asiatic material with immature fruit, collected in stony places upon an alpine summit along the Tschuja River opposite the mouth of the Tschegan River. Several of the specimens from Alaska (for example, *Coville* and *Kearney* 1097, *Rutter* 197) match his description and plate, also specimens of the type collection (legit BUNGE, Hb. Boiss.) very closely. Many other Alaskan specimens fail to have the lateral laciniae of the leaves ovate, as described by LEDEBOUR, but acute instead. Here must be placed *T. alaskanum* Rydb., of which I have examined the type sheet, also the cotype in the Herbarium of the Canadian Geological Survey. Proceeding south from Alaska, forms may be found coming from the high alpine

altitudes of Colorado, Utah, etc., that in some cases look even specifically distinct. Such plants (for example, *Baker*, *Earle*, and *Tracy* 293, *Tweedy* 745 pro parte) are commonly dwarfed, 2–3.5 cm. high, and their diminutive involucres measure sometimes as low as 4–6 mm. in width at base during anthesis. It is these plants that GRAY named *T. laevigatum*, and later *T. officinale* var. *scopulorum*. A study of numerous other specimens, however, especially from Montana, Alberta, and British Columbia, reveals all possible intergradations between the two extremes of foliage and involucre. One of these forms is the *T. rupestre* Greene, of which I have studied the type and all the other material cited by GREENE.

Recently RYDBERG (*loc. cit.*) has created the name *Leontodon scopulorum* for the dwarf alpine forms of the Rocky Mountains, but, as both HANDEL-MAZZETTI and I have finally concluded, this dwarf form is entirely inseparable from *T. lyratum*. Also, for those who discard the name *Taraxacum* but persist in employing the name *Leontodon*, the name *Leontodon lyratus*, as it was originally published by LEDEBOUR, should suffice.

HANDEL-MAZZETTI had seen no mature fruit of the materials regarded by him as *T. lyratum;* but a duplicate (*Jas. M. Macoun*, Mts. at Kicking Horse Lake, British Columbia, Hb. U.S. 219543) of one of the specimens cited by himself (and seen by him at the University of Vienna) has several mature achenes, which are black. Numerous other Canadian specimens examined have likewise black or blackish achenes, but in certain cases these achenes are slightly reddish near the top. At times sheets of material are observed on which the specimens have variously few, many, or all of their leaves spatulate or lanceolate, with margins merely dentate or even subentire. Typical examples of this kind are: *Knowlton* 142, Arizona (Hb. U.S. 41949); *Macoun*, British Columbia (Hb. Can. 98701; Hb. Field 483396); *Coville* and *Kearney* 1097, Alaska (Hb. U.S. 376702); *Walpole* 1791, 1895, and 1987, Alaska (Hb. U.S. 378905, 379011 and 379107 respectively). These specimens are extremely important, for some of them match the specimens of *T. phymatocarpum* from Greenland so minutely that all attempts at separation are fruitless. HANDEL-MAZZETTI (*loc. cit. pl.* 7) presents a distributional map in which he shows *T. lyratum* ran-

ging from southern Colorado northwestward through British Columbia, Alaska, and barely touching Asia.[3] For *T. phymatocarpum* he gives a more northern range, extending from Greenland westward through Alaska and slightly into Asia. My own study, however, leaves me entirely unable to maintain such a separation. To do so would necessitate in many instances actually taking materials on the same sheet, collected at the same time and place, and known to be even racially the same, and dividing them arbitrarily between the two "species," a manifestly absurd and indefensible procedure. In this connection it is interesting to note that, years ago, SERENO WATSON determined a specimen collected by himself in Utah (*Watson* 724, Hb. U.S. 41943) as *T. phymatocarpum* Vahl. He stated expressly on the label that his determination was "fide speciminis in Groen. a Rink lecti." Thus WATSON likewise was convinced of the identity of the Utah material with that of Greenland.[4]

T. fasciculatum Nels. was described from flowering specimens collected by *Alfred A. Griffin* (no. 111) from Wagon Wheel Gap, Blue Park, Colorado, alt. 11000 ft., July 21, 1912. NELSON has been unable to locate the type specimen for me, but the description ("few-several oblanceolate or oblong obtusish merely dentate or denticulate subsessile or short-petioled glabrous leaves 4–7 cm. long"), together with the high altitude recorded, indicates clearly that the plant was *T. lyratum* of the form that, from Greenland, has heretofore been termed *T. phymatocarpum*.

Occasionally a form of *T. lyratum* is found closely simulating the form of *T. ceratophorum* which GREENE described as *T. mutilum*, and differing clearly from "*T. mutilum*" only in having black achenes (for example, *Walpole* 1791 and 1987, Alaska, Hb. U.S. 378905 and 379107 respectively; *Dr. Murdoch*, Alaska, Hb. U.S. 424062 and 424064). Its foliage is long linear or linear-lanceolate, remotely and very sharply toothed. This form matches very closely the type illustrations of *T. hyperboreum* Dahlst., from Gjöa

[3] The type of *T. lyratum*, however, was collected in the interior of Asia!

[4] Elsewhere (U.S. Geol. Explor. Fortieth Parallel 207. 1871) WATSON said: "The present specimen, a single one only, is rather larger than those from Greenland, but is plainly the same plant."

Harbor, lat. 68° 37′ 38″ N., long. 96° 23′ 40″ W., and *T. eurylepium* Dahlst., from Herschell Island (cf. pl. XXXI fig. *c*). DAHLSTEDT had seen no achenes for either of his two proposed species, but a study of *Walpole* 1987 reveals the black achenes, as in typical *T. lyratum*. Numerous variations in foliage and involucre connect the form clearly with true *T. lyratum*, and make it impossible to draw any specific distinctions.

2. TARAXACUM CERATOPHORUM (Led.) DC. Prodr. **7**:146. 1838; *Leontodon ceratophorus* Ledebour, Icon. Pl. Fl. Ross. **1**:9. *pl. 34.* 1829; Fl. Altaica **4**:149. 1833; *T. montanum* Nutt. (non Mey. et DC.), Trans. Amer. Phil. Soc. n.s. **7**:430. 1841; WOOTON and STANDLEY, Contrib. U.S. Nat. Herb. **19**:627. 1915; *T. lividum* Heller, Bull. Torr. Bot. Club **24**:480. 1897 (exclud. synon. Waldst. et Kit.); *T. Chamissonis* Greene, Pittonia **4**:228. 1901; *T. lacerum* Greene, *loc. cit.* 230; *T. dumetorum* Greene, *loc. cit.* 230; *T. mutilum*, Greene, *loc. cit.* 239; *T. leiospermum* Rydb., Bull. Torr. Bot. Club **32**:137. 1905; *T. oblanceolatum* Nels. ex Rydb., Fl. Colorado 410. 1906 (ex synon. *T. dumetorum* Greene);[5] *T. lapponicum* Handel-Mazzetti, Monogr. Taraxacum 73. 1907 (saltem quantum ad plantas americanas, forsan non Kihlm.); *Leontodon dumetorum* Rydb., Fl. Rocky Mts. 1035. 1917; *L. leiospermum* Rydb., *loc. cit.*; *L. monticola* Rydb., *loc. cit.*—Pl. XXXII.

Herba valde polymorpha, plerumque robustior, 7–25 (–35) cm. alta. Radix crassiuscula, nigrescenti-corticata, collo haud vel vix squamato, glabro vel sparsissime lanato. Folia laxe procumbentia, adscendentia vel erecta, herbacea, viridia vel pallida, glabra vel infra sparsissime pilosa, lanceolata vel oblanceolata, 1–6 (–9) cm. lata, infra saepe longe attenuata, ad apicem acuta vel obtusa, leviter sinuato-dentata vel variis modis runcinato-incisa, raro integra vel tenuissime dissecta, lobis acutis, latius angustiusve triangularibus, integris vel dentatis, acutis, lobo terminali plerumque maiore. Scapi singuli vel numerosi, suberecti, florendi tempore foliis plus minusve aequilongi, denique elongati, iuveniles plus minusve lanato-pilosi. Capitula magna, 1.5–2.5 cm. alta et 2–5 cm. lata. Involucrum griseo-viride vel nigrescens, interdum pruinosum. Involucri foliola corniculis plus minusve

[5] AVEN NELSON 8236, distributed by NELSON as *T. oblanceolatum*, is likewise referable to *T. ceratophorum*.

atratis et apicem dilatatum saepe superantibus fere semper instructa, exteriora adpressa vel patentia, late ovata vel lanceolata, interiorum longitudinis $\frac{1}{6}$–$\frac{3}{5}$ (vel raro totum) aequantia, plerumque 5–15 mm. longa, margine decolorato interdum nullo sed saepius praesente et bene distincto. Flores numerosi, magni, foliolis 5–10 mm. longiores, flavi vel sulphurei. Achaenia 4–5 mm. longa, straminea vel brunnea vel griseo-brunnea, supra tuberculis angustis mediocris longitudinis dense obsita et saepe tota rugulosa, in cuspidem crassam vel angustam, brevem vel tertiae parti totius fructus aequantem cuneate attenuata. Rostrum tenue, achaenio paulo vel multo longius. Pappus albus, 5–8 mm. longus.

DISTRIBUTION—Labrador and Alaska southward at higher altitudes to New Hampshire, Massachusetts, Montana, New Mexico, and California; in the entire Arctic region, the mountains of Central Asia, and even "in the Caucasus and in the Alps of Switzerland (a single locality)."

SPECIMENS EXAMINED.[6]—Labrador (Peninsula): Northern Labrador along the Ungava River, August 20, 1896, *Spreadborough* (Hb. Can. 14395); Ungava, *Lucien M. Turner* 613 (Hb. U.S. 222756).

Quebec: Banks of the Grand River, Gaspe County, June 30–July 3, 1904, *M. L. Fernald* (Hb. Field 465065; Hb. U.S. 605794); Rimouski County, July 4, 1907, *Fernald* and *Collins* 1210 (Hb. Can. 86493).

Keewatin: West Coast of Hudson Bay, lat. 56° N., sandy grounds, August, 1886, *James M. Macoun* (Hb. Can. 15112); Churchill, Hudson Bay, lat. 58° 50′ N., July 26, 1910, *idem* (Hb. Cornell Univ.; Hb. Can. 79286; Hb. Field 295238; important as matching exactly the form described by GREENE for his *T. mutilum*).

Manitoba: Birtle, vicinity of, along G.T. Pacif. R.R., June 26, 1906, *Macoun* and *Herriot* (Hb. Can. 77046); Forest, six miles east of, along G.T. Pacif. R.R., June 19, 1906, *iidem* (Hb. Can. 77047); Oak River, along G.T. Pacif. R.R., June 21, 1906, *iidem* (Hb. Can. 77048).

Mackenzie: Cape Barrow (south coast of Coronation Gulf), August 9, 1915, *Cox* and *O'Neil* 451 (Hb. Can. 98712; Hb. Field 483375); Fort Resolution, July 14, 1903, *Edward A. Preble* 210 (Hb. U.S. 421694).

[6] Many specimens are omitted for lack of space. As representing the extreme form with bracts ecorniculate (*T. lapponicum*), there may be added the following examples: Alberta: Near Old Man's River, damp grassy places, August 4, 1883, *Dawson* (Hb. Can. 15124). Wyoming: Northwestern part of state, August 9, 1893, *J. N. Rose* 679 (Hb. U.S. 41951). Utah: Tate Mine, near Marysvale, alt. 9000 ft., August 22, 1894, *Marcus E. Jones* 5853 (Hb. U.S. 233114); Gold Basin, La Sal Mountains, alt. 3000–3300 m., July 11, 1911, *Rydberg* and *Garrett* 8836 (Hb. U.S. 765101). California: Bear Valley, San Bernardino Mountains, in meadows, August, 1882, *S.B.* and *W. F. Parish* 1461 (Hb. Field 208755; Hb. U.S. 783095); Bear Valley, San Bernardino Mts., alt. 6500 ft., June 18, 1894, *S. B. Parish* 3131 (Hb. U.S. 214378).

Saskatchewan: Moose Jaw, open ground by the creek, June 20, 1896, *John Macoun* (Hb. Can. 12737); Moose Jaw, vicinity of, July 13, 1895, *idem* (Hb. Can. 11713); Prince Albert, camp thickets, June 29, 1896, *idem* (Hb. Can. 12283); Wood Mountain Post, thickets, June 11, 1895, *idem* (Hb. Can. 11712); Cypress Hills, thickets, June 24, 1894, *idem* (Hb. Can. 5087; labeled in GREENE's handwriting as being "part of type" of his *T. dumetorum*); Cypress Hills, springy places, June 2, 1884, *J. M. Macoun* (Hb. Can. 15131).

Assiniboia: Medicine Hat, June 8, 1894, *John Macoun* (Hb. U.S. 232067).

Montana: Bridger Mountains, alt. 7000 ft., June 14, 1897, *Rydberg* and *Bessey* 5295 (Hb. Can. 40007; Hb. Field 81947; a form having atypic foliage, possibly a hybrid); Midvale, plains, June 17, 1903, *L. M. Umbach* 75 (Hb. Field 191120; Hb. U.S. 541438); Highwood Mts., June 19, 1888, *R. S. Williams* 434 (Hb. U.S. 288542).

Wyoming: Yellowstone National Park, July 13, 1902, *Edgar A. Mearns* 1779 (Hb. U.S. 486830); Pacific Creek, 65 miles north of Point of Rocks, June 22, 1901, *Merrill* and *Wilcox* 575 (Hb. U.S. 580684).

Colorado: Ruxton Dell, alt. 2900 m., July 17, 1903, *F. E.* and *E. S. Clements* "363.1" (Hb. U.S. 580390); Camp Creek, Larimer County, semi-meadow land, July 6, 1903, *Leslie N. Goodding* 1462 (Hb. U.S. 581396); without locality (lat. 39–41° N.), in 1862 *Hall* and *Harbour* 357 (Hb. Field 17783 314685; Hb. U.S. 41940); Tennessee Pass, Lake County, July 10, 1902, *George E. Osterhout* 2645 (Hb. N.Y.; type of *Taraxacum leiospermum* Rydb.); Gray's Peak, vicinity of, alt. 12000 ft., August 1882 and 1885, *Patterson* and *Beaty* (Hb. Field 209706); Georgetown, vicinity of, June 28–August 7, 1875, *Harry N. Patterson* (Hb. Field 208950); Cuchara River, below Laveta, alt. 2100 m., May 28, 1900, *Rydberg* and *Vreeland* 5540 (Hb. Greene 48459); South Park, July 1873, *John Wolf* 268 (Hb. U.S. 41954); Central Colorado in 1873, *idem* 669 (Hb. Field 211601).

New Mexico: Santa Fe Canyon, 9 miles east of Santa Fe, alt. 8000 ft., June 2, 1897, *A. A.* and *E. Gertrude Heller* 3642 (Hb. Greene 48457; Hb. U.S. 306394; the basis, as to material examined and not as to synonomy Waldst. and Kit., of the name *Taraxacum lividum* Heller); Pecos River National Forest, at Winsor's Ranch, alt. 8400 ft., June 29, 1908, *Paul C. Standley* 4022 (Hb. U.S. 498416); Cloudcroft, June, 1912, *Elmer Stearns* 356 (Hb. U.S. 691021); Cloudcroft, vicinity of, June 30, 1899, *E. O. Wooton* (Hb. U.S. 739580 and 739583); Cox Canyon, Sacramento Mts., August 9, 1899, *idem* (Hb. U.S. 562510, 735339, and 739582); Silver Spring Canyon, Sacramento Mts., July 6, 1899, *idem* (Hb. U.S. 739581); Winter Folly, Sacramento Mts., August 13, 1899, *idem* (Hb. U.S. 735338).

Alaska (and neighboring islands): Fort St. Michaels, Norton Sound, June 23, 1865–1866, *H. M. Bannister* (Hb. Cornell Univ.; Hb. Field 301948); St. Paul Isl., July 9, 1899, *L. J. Cole* (Hb. U.S. 376691); Kadiak, July 2, 1899, *idem* (Hb. U.S. 376690); Kukak Bay, July 1–5, 1899, *Coville* and *Kearney* 1524 and 1690 (Hb. U.S. 376708 and 376711); Hall Island, July 14, 1899, *iidem* 2028 (Hb. U.S. 376716); Unalaska, July 8, 1899, *iidem* 1721 (Hb. U.S.

376713); Attu Isl., June 26, 1873, *W. H. Dall* (Hb. U.S. 424065); Unalaska, July 11, 1892, *B. W. Everman* 69 (Hb. U.S. 376727); Dutch Harbor, Unalaska Isl., July 17, 1899, *B. E. Fernow* (Hb. Cornell Univ.); Johnson River, between Cook Inlet and the Tanana River, June 27, 1899, *E. F. Glenn* (Hb. U.S. 376755; type material of *Taraxacum mutilum* Greene); Iliamna River, Lake Iliamna region, open woods, June 29, 1902, *M. W. Gorman* 80 (Hb. U.S. 420101); Copper Center, vicinity of, in 1908, *C. W. H. Heideman* 78 (Hb. U.S. 421973); Unalaska, *A. Kellogg* 301 (Hb. U.S. 424067 and 424068); Popof Isl., Shumagin Isls., July 8–19, 1899, *Trevor Kincaid* (Hb. U.S. 376794); St. Matthew Isl., August 11, 1891, *James M. Macoun* (Hb. U.S. 249296); St. Paul Isl., August 3, 1891, *idem* (Hb. Can. 20478); St. Paul Isl., dampish banks, July 13, 1896, *idem* (Hb. Can. 20479); St. Paul Isl., grassy banks, July 1897, *idem* (Hb. Can. 20481; labeled "*Taraxacum Chamissonis*, Greene typical" in Greene's own handwriting); St. Paul Isl., June 23–August 7, 1914, *idem* (Hb. Can. 94004); Kodiak Isl., crevices of rocks, May 31, 1897, *idem* (Hb. Can. 16754); Hall Isl., crevices of rocks, August 11, 1891, *idem* (Hb. Can. 20621); Unalaska, July 4, 1896, *idem* (Hb. Can. 16755; labeled typical *T. Chamissonis* by E. L. GREENE); Valley of Alatna River, about 15 miles above its mouth, July 20, 1901, *W. C. Mendenhall* (Hb. U.S. 377350); St. Paul Isl., August 4, 1891, *C. Hart Merriam* (Hb. U.S. 424071); Kenai, June 9, 1901, *H. P. Nielsen* 11 (Hb. U.S. 378436); St. Paul's Island, July 19, 1890, *Wm. Palmer* 304 (Hb. U.S. 327969); Kodiac, July 28, 1904, *C. V. Piper* 4231 (Hb. U.S. 420683); Kenai, August 18–20, 1904, *idem* 4228 (Hb. U.S. 420680); Unga Isl., Shumagin Isls., July 12–14, 1899, *DeAlton Saunders* (Hb. U.S. 376801); Adakh Isl., July 1, 1893, *C. H. Townsend* (Hb. U.S. 219332); St. Paul Isl., August 14, 1895, *True* and *Prentiss* 82 (Hb. U.S. 231549); Tuksuk Channel, vicinity of Port Clarence, rocky banks, August 5, 1901, *F. A. Walpole* 1746 (Hb. U.S. 378852); Cape Espenberg, lat. 66° 38′ N., long. 163° 46′ W., July 28, 1894, *James T. White* (Hb. U.S. 270305); St. Lawrence Isl., August 27, 1894, *idem* (Hb. U.S. 270328).

Yukon: Canyon of the Upper Liard River, lat. 60°, June 26, 1887, *Dawson* (Hb. Can. 15119; type of *Taraxacum lacerum* Greene); Coral Creek Hill, Yukon River, June 29, 1893, *Frederick Funston* 101 (Hb. U.S. 370774); Herschell Isl., lat. 69° 35′ N., long. 139° W., August 1914, *Frits Johansen* 233 (Hb. Can. 98717; Hb. Field 483379); Five Finger Rapids, July 4, 1899, *J. B. Tarleton* 72 (Hb. U.S. 391518).

British Columbia: Mt. McLean, near Lillooet, alt. 7000 ft., July 29, 1916, *J. N. Macoun* (Hb. Can. no. 98692 in Hb. Field, 483391); Mt. McLean, alt. 6500 ft., July 29, 1916, *idem* (Hb. Can. no. 98693 in Hb. Field, 483392); Mt. McLean, alt. 6300 ft., July 29, 1916, *idem* (Hb. Can. 98694); Mt. McLean, alt. 6000 ft., July 29, 1916, *idem* (Hb. Can. 98695); Mt. McLean, along irrigation ditch, alt. 5000 ft., July 3, 1916, *idem* (Hb. Can. no. 98696 in Hb. Field, 483393); Mt. McLean, alt. 6500 ft., July 22, 1916, *idem* (Hb. Can. no. 98697 in Hb. Field, 483394); Mt. McLean, alt. 5500 ft., July 19, 1916, *idem* (Hb. Can. no. 98699 in Hb. Field, 483395); Whipsaw Creek, west of

Princeton, July 24, 1905, *idem* (Hb. Can. 77000); Yale, grassy slopes, May 17, 1889, *John Macoun* (Hb. Can. 15120); Spence's Bridge, damp grassy places, May 28, 1889, *idem* (Hb. Can. 15130); Fraser River, west of, damp grassy places, June 10, 1875, *idem* (Hb. Can. 15121); Kicking Horse Lake, Rocky Mts., July 18, 1885, *idem* (Hb. U.S. 219795).

Alberta: Jasper Park, at Shovel Pass, low ground near a brook, alt. 6000–6500 ft., August 20, 1918, *James M. Macoun* (Hb. Can. nos. 98686, 98687, and 98688 in Hb. Field, 483386, 483387, and 483388, respectively); Island Creek, north of Peace River, July 15, 1903, *idem* (Hb. Can. 61240); Bragg's Creek, foothills south of Calgary, July 16, 1897, *John Macoun* (Hb. Can. 22776); Calgary, 3 miles west of, along railroad, June 7, 1897, *idem* (Hb. Can. 22792); Banff, swamps, June 27, 1891, *idem* (Hb. Can. 15127); St. Ann, June 9, 1898, *W. Spreadborough* (Hb. Can. 19744).

Utah: Uintah Mts., above Bear River, alt. 12000 ft., August 1869, *Sereno Watson* 723 (Hb. U.S. 41937); Marysvale, alt. 6000 ft., May 21, 1894, *Marcus E. Jones* 5338 (Hb. U.S. 326832; a very unique specimen with exterior bracts of involucre greatly elongated and almost equal to the interior bracts, the flowering head over 5 cm. wide).

California: Bear Valley, San Bernardino County, alt. 6500 ft., June 3, 1901, *S. B. Parish* 4977 (Hb. U.S. 414859).

Besides the specimens cited, I have examined a number from the locality (Kamchatka; also Bering Island, Commander Islands, etc.) whence LEDEBOUR obtained his type. Most of the material from that vicinity, from the Aleutian Islands, and from Alaska proper, has the outer bracts tending to be rather short, ovate, and notably blackish when dried, with the scarious margins highly distinct. This character is not constant, however, and there are numerous variations seen. South of Alaska, nearly every specimen examined has longer, more lanceolate bracts, which tend to remain pale or dark green when dried. Even here, however, there are some marked exceptions to the rule. Thus, for example, *Standley* 4022 from New Mexico (Hb. U.S. 498416) has the dark, scarious-margined, ovate outer bracts typical of the Alaskan material.

GREEN (Pittonia 4:228. 1901), writing upon *Taraxacum* in North America, named the Bering Sea form *T. Chamissonis*.[7]

[7] While GREENE cited no type, many of the Bering Sea specimens listed (in Hb. Can. and Hb. U.S.) had been examined by him and are labeled *T. Chamissonis* in his own handwriting. As noted, the specimen by *J. M. Macoun* from St. Paul Island (Hb. Can. 20481) had been labeled "typical" by him and may be regarded as being practically type material.

He stated that "its most constant peculiarity is that of a very dark-colored, almost blackish, involucre, of which the outer scales are very broad, strictly erect, and imbricated." Reference to LEDEBOUR'S work, however, shows that this was essentially the form which LEDEBOUR described from Kamchatka as *T. ceratophorum* ("squamis omnibus erectis; exterioribus lato-lanceolatis, nigricantibus" etc.),[8] hence *T. Chamissonis* is to be regarded as typical *T. ceratophorum*.

T. lacerum Greene and *T. mutilum* Greene are plainly mere foliage forms of *T. ceratophorum*. The type sheet of *T. lacerum* (in Hb. Can.) bears four small plants. These are not noticeably different from ordinary *T. ceratophorum* except as to the unique leaves,[9] which consist only "of a linear rachis-like body and a few pairs of divaricate or retrorse subulate-linear or falcate lobes." The bracts are highly ceratophorous. I have not been permitted to examine the type of *T. mutilum* (in Hb. Mo. Bot. Gard.), but an excellent cotype, previously cited, is in the U.S. National Herbarium.[10] This has leaves slightly less reduced than in *T. lacerum*, but bracts practically as corniculate. It is matched very closely by *J. M. Macoun's* plant from Churchill, Hudson Bay (Hb. Can. 79286), and, somewhat less closely, by *White* and *Schuchert* 110 from Baffin Land. The discontinuous distribution indicated by the four collections (*T. lacerum* from northern boundary of British Columbia, *T. mutilum* from Johnson River in Alaska, from along Hudson Bay, and from Baffin Land), suggests that either these forms represent one valid species of highly interrupted range or else they are merely foliage forms of *T.*

[8] Fl. Altaica 4:149. 1833. In his still earlier work (Icon. pl. Fl. Ross. 1:9. 1829), LEDEBOUR gave only an abridged description: "L. anthodii squamis erectis infra apicem longe corniculatis; exterioribus lato-lanceolatis; interioribus lanceolatis, foliis runcinato-sinuatis: laciniis inaequalibus; majoribus subtriangularibus. Hab. in Kamtschatka. 4 Fl. Majo, Junio." His accompanying plate (*pl. 34*) is somewhat crude and shows the outer involucre spreading above the middle and consisting of narrowly lanceolate or even linear bracts. Apparently LEDEBOUR himself had noticed this discrepancy; for in his later description in the *Flora Altaica*, not only did he retain the character "lato-lanceolatis" for the outer bracts, but he actually inserted the word "omnibus" to qualify "squamis erectis."

[9] These resemble very closely those figured by HANDEL-MAZZETTI (Monogr. Taraxacum, *pl. 5. fig. 2.* 1907) for *T. balticum*, a species unknown to me.

[10] Indeed, GREENE himself had even written "type" upon the label of this specimen, although in his description he listed Hb. Mo. Bot. Gard. as containing the type.

ceratophorum. Touching this point, a parallel study of *T. lyratum* is very illuminating. In several cases I have seen among material that was positively *T. lyratum* a freakish foliage form that looked superficially just like *T. mutilum*. In fact one of these specimens (*Walpole* 1987, Hb. U.S. 379107) appears to have deceived GREENE, for he had labeled it *T. mutilum*. Inasmuch as true *T. lyratum* is seen thus to produce a similar foliage form at times, and since true *T. ceratophorum* is known to be present wherever *T. mutilum* or *T. lacerum* has been collected, there seems to be no reason for considering either *T. mutilum* or *T. lacerum* distinct from *T. ceratophorum*. At the most they evidently can rank no higher than mere forms or varieties.[11]

Many older specimens have been determined in herbaria, some by ASA GRAY, as *T. montanum* Nutt. (non Mey. et DC.), a species cited by NUTTALL from "on the banks of the Platte, in subsaline situations toward the Rocky Mountains, and in the highest valleys of the Colorado of the West." This name was retained by WOOTON and STANDLEY (Contr. U.S. Nat. Herb. **19**:627. 1915) notwithstanding the validity of the previous name *T. montanum* (Mey.) DC. RYDBERG (Fl. Rocky Mts. 1035. 1917), however, recognizing the impropriety of retaining NUTTALL'S duplicating name, created the new and similar name (*Leontodon*) *monticola*, which thus is directly equivalent by synonomy with NUTTALL'S species. Even if NUTTALL'S species had been taxonomically worthy, however, which it was not, RYDBERG'S new name for it would be invalid, as GREENE (*loc. cit.*) had already created the name *T. dumetorum* for material which came from the same region and which did not specifically differ.[12] Obviously GREENE'S name would have

[11] It may be noted, however, that HANDEL-MAZZETTI (Monogr. Taraxacum 87. *pl. 5. fig. 2.* 1907) separates an apparently corresponding form of Europe, *T. balticum*, from the broader leaved *T. paludosum* (cf. footnote 9).

[12] WOOTON and STANDLEY, and also RYDBERG do in fact present *T. dumetorum*, which they have sought to differentiate as a separate species. I have examined all the types (in Hb. Greene) and other specimens cited for *T. dumetorum* by GREENE, and can find no differences other than those that can be proved to be field variations, or that would pass with the great majority of taxonomists as typifying merely inconstant forms. NUTTALL'S description, "caliculum biserial, short and appressed, the scales ovate or lanceolate, with broad membranaceous margins; sepals not corniculate, about twelve" shows that his plant was the form later treated by HANDEL-MAZZETTI as *T. lapponicum* Kihlm. In NUTTALL'S plant the bracts were thus not corniculate, whereas in typical *T. dumetorum* cornicula are present. These distinctions, however, do not appear to be of any value specifically.

preference. Yet even here we are confronted with difficulty, since the *T. dumetorum* type specimens (from Dale Creek, Wyoming, in Hb. Greene) are clearly a mere form or variety of true *T. ceratophorum*. Indeed, an additional "quite typical" specimen cited by GREENE (*Williams* 434) had once been listed by RYDBERG himself (Fl. Montana 484. 1900) as *T. ceratophorum*. Why he later abandoned the name (vide Rydb., Fl. Rocky Mts. 1034–1035. 1917) is not clear. As already stated, the American specimens from points south of Alaska (as also many from Alaska itself) tend to have external bracts somewhat different from those of Bering Sea (that is, typical) material. These exterior bracts vary from dark to light, from short to long, from ovate to lanceolate, from corniculate or widely dilated-bifid at apex to ecorniculate and acute, from appressed to spreading.[13] Occasionally they are as long as the inner bracts. Sometimes both sets of bracts are apically dilated, sometimes only the outer or inner set. Viewed in the light of these facts, *T. dumetorum* is seen to be synonymous with *T. ceratophorum*.

HANDEL-MAZZETTI (*loc. cit.* 73), in dealing with *T. ceratophorum*, makes a singular segregation of specimens under the separate binomial *T. lapponicum* Kihlm. The range given is essentially the same as recognized by him for *T. ceratophorum*. The chief diagnostic distinction relied upon appears to be the ecorniculate character of the bracts. It is with reluctance that I am compelled to reject his treatment.[14] The species concept and "species sense" of one who, like HANDEL-MAZZETTI, has surveyed the entire genus for all the regions of the world, are naturally and very properly entitled to high respect, but the variations in the corniculate character of the bracts are so great in North American specimens as to render illogical and really impossible any such differentiation (cf. footnote 12). It does not also appear that we even have two parallel series, connected, as stated by HANDEL-MAZZETTI, with each other by numerous intermediate

[13] In one specimen from the type locality of *T. ceratophorum* (*C. Wright*, Petropaulovski, Kamchatka, 1853–1856, Hb. U.S. 424073), the outer bracts are lanceolate and their margins are scarious only to a very slight degree.

[14] At least as to North American plants. As to the status of *T. lapponicum* Kihlm. in Europe, I have seen too few specimens to judge accurately.

forms.[15] The *lapponicum* form is much less abundant and appears to be merely an offshoot from *T. ceratophorum*. Sometimes, however, especially in the northeastern part of the continent, it passes into *T. vulgare*.[16] FERNALD and ROBINSON (Gray's *Manual*, ed. 7. 865. 1908) evidently included some of these transitional forms in their *T. officinale* var. *palustre* Blytt, from "eastern Quebec to Connecticut." At the time true *T. ceratophorum* was unknown to them from New England (cf. FERNALD, Rhodora **4**:155. 1902), but since then it has been discovered by PEASE (Rhodora **19**:111 and 221. 1917) in New Hampshire; and many years before a specimen was collected by ROBBINS.[17] The true *T. officinale* var. *palustre* (*T. paludosum* [Scop.] Schlecht.) is not cited for North America by HANDEL-MAZZETTI.[18]

T. leiospermum Rydb., from Colorado, is found to differ from the ordinary *T. ceratophorum* merely in having slender ecorniculate bracts and a slightly greenish tint to the brown, less muricate achenes. In HANDEL-MAZZETTI'S treatment *T. leiospermum* would belong, more precisely, with *T. lapponicum*. Of all the many specimens that I have studied, I have found no other specimen exactly matching RYDBERG'S type (in Hb. N.Y.) in the smoothness and color of the achenes. My failure in this respect suggests that the type was merely one of the excessively numerous forms conspicuous in this genus, which apparently often are

[15] "In der ganzen Zone der Gebirge des westlichen Nordamerika ist *T. ceratophorum* mit *T. lapponicum* durch zahlreiche Formen verbunden, die in den Merkmalen der Hüllblättchen Zwischenstellungen einnehmen," *loc. cit.* 66.

[16] HANDEL-MAZZETTI (*loc. cit.* 84) gives an exhaustive treatment of numerous forms intermediate between *T. vulgare* and *T. paludosum*, the latter being a species very close to *T. lapponicum*. He cites none for America, however.

[17] I have not seen this specimen. It was found in the herbarium at Berlin by HANDEL-MAZZETTI, and was determined by him as *T. lapponicum*.

[18] At various times some of our foremost American botanists have used the names *palustre* and *alpinum* for American specimens of *T. ceratophorum*. The real *T. paludosum* (Scop.) Schlecht and *T. alpinum* (Hoppe) Heg. and Heer, dating back originally to 1772 and 1821 respectively, are not given by HANDEL-MAZZETTI for North America. While I have been unable to examine enough European material to permit of definite conclusions, it would seem that the two species are too close together. In any case, it appears certain that if American forms of *T. ceratophorum* with ecorniculate bracts are to be segregated, they must be referred to *T. paludosum* or *T. alpinum*, rather than to the more recent *T. lapponicum*.

perpetuated here and there through parthenogenetic reproduction.[19]

Taraxacum lividum Heller (exclud. synon. Waldst. et Kit.) is seen, from the specimens cited (*A. A.* and *E. G. Heller* 3642), to be likewise a form of *T. ceratophorum*. Most of the bracts are ecorniculate, thus placing the plants, in HANDEL-MAZZETTI'S treatment (*loc. cit.* 74), with *T. lapponicum*.

3. TARAXACUM ERIOPHORUM Rydb., Fl. Montana, Mem. New York Bot. Gard. 1:454. 1900 (non Schott ex Tchihatcheff, Asie mineure 3^2:372. 1860; nomen nudum quod=*T. syriacum* Boiss., fide Handel-Mazz., Monograph. Taraxacum 162. 1907); *T. ovinum* Greene, Pittonia 4:229. 1901; *T. angustifolium* Greene, *loc. cit.*; *T. ammophilum* Nels. ex Greene, *loc. cit.* 233. *L. eriophorum* Rydb., Fl. Rocky Mts. 1035. 1917, *L. angustifolium* Rydb. *loc. cit.*; *L. ammophilum* Rydb., *loc. cit.* Pl. XXXIII.

Herba polymorpha, nunc pumila et rosulata (forma descriptionis orig.), nunc robustior, 3–8 (etiam −30) cm. alta. Radix et folia et scapi eis *T. ceratophori* non conspicue dissimiles, foliis autem saepius membranaceis et pallidis, rarius profunde pinnatifidis, iuvenilibus raro longe lanuginosis versus basim. Capitula 1.5–2.5 cm. alta et paulo latiora. Involucrum pallidum vel atroviride. Involucri foliola plerumque ecorniculata vel rarissime ad apicem dilatato-corniculata et plus minusve atrata, exteriora adpressa vel minime patentia, interiorum longitudinis 0.2–0.6 aequantia, 4–15 mm. longa, margine plus minusve distincte decolorato. Flores vivi ad anthesin non observati. Achaenia 4–5 mm. longa, rufa rufopurpureave, supra tuberculis angustis vel spinulis dense obsita, saepe acute tetragona, in cuspidem crassam vel angustam, et brevem vel quartae parti totius fructus aequantem cuneate attenuata. Rostrum tenue, achaenio paulo vel multo longius. Pappus albus, 4–8 mm. longus.

DISTRIBUTION.—Alberta to Wyoming; a form with highly corniculate bracts occurs in Alaska.

SPECIMENS EXAMINED.—Alberta: Morley, meadows, etc., June 12, 1885, *John Macoun* (Hb. Can. 15117); Laggan, June 28, 1905, *idem* (Hb. Can. 65618 and 65619); Waterton Lake, Sheep Mt., July 31, 1895, *idem* (Hb. Can. 11711, type of *T. ovinum* Greene; Hb. Greene 48435).

[19] Concerning the fixation of new colors in *Taraxacum* achene coats through the operation of parthenogenesis, cf. footnote 24.

Alaska: Vicinity of Port Clarence, gravel flats near beach, Teller Reindeer Station, September 3, 1901, *F. A. Walpole* 1980 (Hb. U.S. 379098).

British Columbia: Kicking Horse Lake, Rocky Mountains, springy places, July 20, 1885, *John Macoun* (Hb. Can. 15128; Hb. Field 227895).

Montana: Sheridan, in 1892, *Mrs. L. A. Fitch* (Hb. Mont. Agric. Exper. Sta.; type); Anaconda, mountain swales, alt. 6000 ft., May 20, 1906, *J. W. Blankinship* 723 (Hb. Can. 73794; Hb. Field 225568; Hb. U.S. 541188).

Wyoming: Dale Creek, July 1, 1896, *Edward L. Greene* (Hb. Greene 48449, 48450, and 48451; the three type sheets of *T. angustifolium* Greene); Pole Creek, June 2, 1894, *Aven Nelson* 109 (Hb. U.S. 284425); Horse Creek, June 9, 1894, *idem* 205 (Hb. Field 432099; Hb. U.S. 284424); Sand Creek, Albany Co., May 31–June 1, 1900, *idem* 6987 (Hb. Greene 48427, type of *T. ammophilum* Nelson ex Greene; Hb. U.S. 433375); Sand Creek, Albany Co., June 1, 1900, *idem* 6988 ex parte (Hb. U.S. 433376).

The specimens originally distributed by NELSON (no. 6987) as *T. ammophilum* are rather small, averaging mostly under 1 dm. in height, and are of a pallid, somewhat glaucous appearance. Their achenes, when mature, are distinctly reddish, as in *T. laevigatum*. The involucral bracts are almost entirely without dilations at the apex. Except for the achenes, the plants match perfectly some plants considered by HANDEL-MAZZETTI as *T. lapponicum* Kihlm., but regarded by myself as a form or variety of *T. ceratophorum*. They are in no way referable to the European *T. laevigatum*, as suspected by HANDEL-MAZZETTI (*loc. cit.* 110), who appears never to have seen NELSON'S specimens.

Some of the material examined is darker green, but otherwise identical. *Blankinship* 723 from Montana, consisting mostly of immature specimens, is an example of this. The Blankinship plants are particularly instructive, further, in showing the aspect of immature and dwarfed plants. Some of these (for example, Hb. Field 225568) match exactly RYDBERG'S three tiny immature type specimens of *T. eriophorum* (in Hb. Mont. Agric. Exper. Sta.).[20] RYDBERG did not describe the achenes, since there were no mature ones present.[21] The immature achenes of the Blankinship collection are brown, as in RYDBERG'S type material, but the

[20] BLANKINSHIP'S plants were collected at Anaconda, a distance of only 55 miles (90 km.) from Sheridan, whence the type of *T. eriophorum* came.

[21] The name *eriophorum* alluded to the brown hairs found on the small type plants, but this character is entirely inconstant in this species and has no real taxonomic value.

nearly mature ones (for example, Hb. U.S. 541188) are distinctly reddish. Thus RYDBERG'S type plants are seen to be connected perfectly with the type material of *T. ammophilum*, and, from priority, the name *T. eriophorum* must have the preference.

The type material of *T. ovinum* Greene, from Alberta, consists of several small, more or less dwarfed and immature specimens. The achenes in the oldest head found (in Hb. Can.), while not yet very reddish, have the acutely tetrangular shape that I have observed in numerous other mature specimens of *T. eriophorum*. The involucre, although sometimes duplicated by *T. ceratophorum*, is more typical of *T. eriophorum*, and there remains no doubt that *T. ovinum* is purely synonymous with *T. eriophorum*.

T. angustifolium Greene was founded upon three specimens from Dale Creek, Wyoming. The leaves and scapes are much better developed than in *T. ovinum*, the scapes reaching a height of over 2.5 dm.; but the technical characters of the head are essentially the same. Moreover, the numerous mature achenes are definitely reddish in color. GREENE (*loc. cit.* 232) termed their color "chestnut brown," but inaccurately so, for the color is fully as reddish as in many genuine specimens of the red-achened *T. laevigatum*. The leaves are rather long, slender, and graceful, but certainly do not serve to separate the plants specifically from true *T. eriophorum*.[22]

HANDEL-MAZZETTI (*loc. cit.*) has omitted *T. eriophorum* Rydb. entirely from his monograph, and it is evident that he was entirely unfamiliar with it. The species is closely parallel with *T. ceratophorum*, from which it differs in having red achenes and in having the bracts much more often slender and without dilated tips. One might wonder whether it may be only a form of *T. ceratophorum* in which the achenes are red. Various investigators have shown that apogamy or parthenogenesis is frequent in *Taraxacum*.[23] SCHKORBATOW (Entwickelungsgeschichtliche Stud. an *Taraxacum officinale* Wigg., Bot. Institut. Charkow, p. 50. 1910) also states

[22] Almost the exact counterpart to this foliage is sometimes observed in a form of *T. ceratophorum* (for example, *Mendenhall*, Valley of Alatna River, Hb. U.S. 377350).

[23] For references to the experiments and observations of RAUNKIAER, MURBECK, JUUL, and others, see IKENO, Ber. Deutsch. Bot. Gesells. **28**:394. 1910.

that various colors of achenes may thus become fixed and hereditary.[24] Whether, however, the colors will remain fixed in the achenes of all the plants of a locally generated race upon a recurrence of normal fertilization (with attendant lapse of apogamy) is doubtful. Surely subsequent cross-pollination with specimens from the antecedent stock might be expected to occur and to result, at times, in a repetition of the former achene color. In any case, the observable tendency of the achenes of *T. eriophorum* to be more sharply tetragonal and of the bracts to be undilated at the apex in a much higher percentage of specimens, makes it seem that *T. eriophorum* is not a red-fruited variety of *T. ceratophorum*, but is rather a distinct species.

The Alaskan specimen by *Walpole* (no. 1980, Hb. U.S. 379098) has slender elongate leaves, much as in the types of *T. angustifolium*, and its achenes are bright red. The involucral bracts, however, especially the inner ones, are exceedingly corniculate, much as in the extremely corniculate forms of *T. ceratophorum*.[25]

4. TARAXACUM VULGARE (Lam.) Schrank, Primit. Fl. Salisburg. 193. 1792; *Leontodon Taraxacum* Linn., Sp. Pl. **2**:798. 1753 (diagnose incompl. fide Handel-Mazz.); Pollich, Hist. plant. Palatin. **2**:379. 1777; *L. vulgare* Lamarck, Fl. Françoise **2**:113. 1778; *T. officinale* Weber, Prim. Pl. Holst. 56. 1780; Roth, Tentam. Fl. Germ. **2**²:147. 1793; *T. Dens-leonis* Desf., Fl. Atlant. **2**:228. 1800 (fide Indicis Kew., locum cit. non vidi); *T. latilobum* DC., Prodr. **7**:146. 1838; *T. mexicanum* DC., *loc. cit.*; *T. officinale* var. *palustre* Fernald and Robinson, Gray's Man., ed. 7, p. 865. 1908 (forsan non [Smith] Blytt, Bentham, et al.); *T. paradoxum* Somes, Amer. Botanist **15**:27. 1909; *L. latilobum* Britton, Britt. and Brown Ill. Fl. N. Amer., ed. 2, **3**:315, *fig. 4063*. 1913; *T. minus*

[24] "In der Natur findet man verschiedene Farben-Schattierungen an den *Taraxacum*-Früchten, von dunkelbraun bis hellgrünlich: die ausgesprochenen Färbungen in typischen Modificationen genommen (rein hellgrün und rein dunkelbraun) werden als solche durch Vererbung fixirt." (L. SCHKORBATOW, *loc. cit.* For English summary of SCHKORBATOW'S work, see CHAMBERLAIN, BOT. GAZ. **52**:167. 1911.)

[25] To those who accept HANDEL-MAZZETTI'S differentiation of North American material between *T. ceratophorum* and *T. lapponicum*, this specimen will appear correspondingly distinct from *T. eriophorum*. I have found no such intermediate forms in *T. eriophorum*, respecting dilations of the bract tips, as are abundant in *T. ceratophorum*. Nevertheless, there seems insufficient evidence at hand to warrant proposing *Walpole's* 1980 as the type of a new species.

Lon. et var. *subscaposum* Lunell (ex synon. *L. Taraxacum* Britton, etc.), Amer. Midl. Nat. 5:31. 1917; *L. mexicanum* Rydb., Fl. Rocky Mts. 1034. 1917.

Herba plerumque maiuscula, 5–50 cm. (rarissime "—1.20 m.") alta. Radix crassa, simplex vel multiceps, fusce corticata, collo vix squamato, large lanigero vel raro glabro. Folia nunc terrae adpressa, nunc suberecta, viridia, plerumque infra et in nervo medio sparse pilosa vel rarius glaberrima, plerumque ampla, plus minusve oblanceolata (7 mm. —15 cm. lata), acuta vel obtusa, versus basim brevius longiusve angustata, rarius large dentata tantum, plerumque autem variis modis, interdum usque ad nervum medium, runcinato-incisa, lobis latius angustiusve triangularibus vel rarius linearibus, integris vel dentato-fissis, recurvis, saepe lobulis minoribus interiectis, lobo terminali plerumque maiore. Scapi numerosi vel raro singuli, erecti vel adscendentes, crassi (2–7 mm.), florendi tempore sub capitulo saltem longe lanigeri, denique raro glabri, floriferi foliis = aequilongi, rarius multo breviores vel multo longiores. Capitula magna (solum in speciminibus depauperatis parva), circum 2–2.5 cm. longa et aperta latitudine multo maiore. Involucri foliola numerosa, utriusque seriei = 15–20, griseo-viridia, raro atrata, interdum leviter pruinosa, ecorniculata vel raro corniculis parvis vel rarissime maioribus instructa, linea dorsali fusca nulla. Exterioris seriei foliola interioribus vix latiora, sed paulo breviora, inter se fere aequilonga, iam in alabastris adultioribus supra basim reflexa, vel raro patula vel unum alterumve eorum vel rarissime plurima semper erecta, linearia (1.3–3 mm. lata et 12–14 mm. longa) vel rarissime latiora, margine raro indistincte decolorato. Flores numerosissimi, lutei vel raro subpallidiores, involucro circum 5–10 mm. longiores. Achaenia parva, 3–4 mm. longa, pallide griseo- vel olivaceo-brunnea, supra tuberculis mediocribus longioribusve dense obsita, in cuspidem cylindricam longiusculam et tenuem vel brevissimam et crassam, totius fructus sextam vel rarius tertiam fere partem metientem abruptissime contracta. Rostrum tenue, achaenio duplo vel plus triplo longius. Pappus albus, 6–8 mm. longus, rostro brevior.

DISTRIBUTION.—Labrador and North Carolina to Alaska, California, and Mexico, and elsewhere almost throughout the world; indigenous (fide Handel-Mazz.) in meadows of Europe and Western Asia.

SPECIMENS EXAMINED.—Labrador: Rama, August 20–24, 1897, *J. D. Sornberger* 64*x* (Hb. U.S. 411050; a form with the leaves lanceolate to spatulate and not deeply incised, some of them merely denticulate).

Newfoundland: Hermitage Bay, vicinity of Balena, June 16, 1903, *William Palmer* 1365 (Hb. U.S. 492202).

Quebec: Mt. Albert, Gaspe County, by alpine brooks or in crevices of wet hornblende schist, alt. 600–1075 m., July 20, 1906, *Fernald* and *Collins* 263 (Hb. U.S. 606098); Mt. Albert, Gaspe County, meadows and fields, also on mountains, August 19, 1882, *John Macoun* (Hb. Can. 15113); Salt Lake, Anticosti Isl., pastures and fields, August 11, 1883, *idem* (Hb. Can. 15105); Orono and vicinity, fields, September 1890, *F. L.* and *LeRoy H. Harvey* 579 (Hb. U.S. 606242); Orono, June 2, 1897, *P. L. Ricker* 233 (Hb. U.S. 414356); St. Francis River, at Boundary Lake, August 14, 1902, *W. W. Eggleston* (Hb. U.S. 492531).

Massachusetts: Middleboro, May 14, 1901, *Joseph Murdoch* (Hb. Field 471888); Middleboro, May 14, 1901, *Richard Murdoch* (Hb. Field 472180).

Rhode Island: Cumberland, railroad embankment, May 9, 1900, *E. B. Chamberlain* 68 (Hb. U.S. 491069).

New York: Chemung County, roadsides and fields, May 19, 1893, *T. F. Lucy* 14529 (Hb. Field 5306); Cold Spring Harbor, Long Island, waste places, August, 1903, *H. N. Whitford* 20 (Hb. Field 144122).

Pennsylvania: Westtown Farm, Chester County, May 26, 1905, *S. P. Hadley* 1 (Hb. U.S. 646339); Ephrata, vicinity of, May 14, 1900, *A. A. Heller* (Hb. Field 430006; Hb. U.S. 407015); Conestoga Creek, east of Lancaster, *idem*, April 28, 1900 (Hb. U.S. 407016; form with finely divided leaves); Conestoga Creek, Lancaster, May 2, 1890, *John K. Small* (Hb. Field 168088 and 168089); Harrisburg, June, 1887, *idem* (Hb. Field 168174); Conewago, vicinity of, May 14, 1891 (Hb. Field 167805 and 167810).

District of Columbia: without locality, in 1863, herb. M. S. Bebb (Hb. Field 17549).

Virginia: Louden County, August 1888, *Jesse H. Holmes* (Hb. U.S. 41946 and 41948); Chatham Hill Gap, Walker Mountain, Smyth County, alt. 3000 ft., June 13, 1892, *John K. Small* (Hb. Field 390271); White Top Mountain, Smyth County, alt. 4000–5000 ft., May 28–29, 1892 (Hb. Field 390272).

West Virginia: Pickens, June 24, 1908, *Huron H. Smith* 1364 (Hb. Field 241895).

North Carolina: Roan Mountain, September 1, 1902, *W. A. Cannon* 223 (Hb. U.S. 510188).

Ontario: Kingston, May 27, 1897, *J. Fowler* (Hb. Field 83469); Kingston, May 29, 1895, *idem* (Hb. U.S. 249777).

Ohio: Dayton, abundant and troublesome as a weed, May 25, 1904, *J. Lane Reed* (Hb. U.S. 444728 and 444729; a gigantic form escaped from cultivation, the leaves becoming, before end of fruiting period, over 4 dm. long and the scapes 7.75 dm. long); Chillicothe, in 1885, *H. T. Safford* 12 (Hb. U.S. 515462).

Michigan: Schoolcraft, uncleared ground, June 11, 1903, *A. B. Burgess* 129 (Hb. Field 141460).

Indiana: Mattsville, vicinity of, in open ground, May 10, 1892, *Guy Wilson* 19 (Hb. U.S. 228418); Mishawaka, June 1891, *E. B. Uline* (Hb. Chi. 260181).

Wisconsin: Green Bay, April, *J. H. Schuette* (Hb. Field 377994); Brown County, in yard, without date, *idem* (Hb. Field 377995).

Illinois: Evanston, dry field, July 4, 1919, *Earl E. Sherff* 3087 (Hb. Field 484462 and 484463), and in rich woods, July 4, 1919, *idem* 3088 and 3090 (Hb. Field 484464, 484465 and 484468, 484469 respectively); Urbana, open thicket, May 28, 1907, *Frank C. Gates* "1561:3" (Hb. U. S. 649050).

Minnesota: Fort Snelling, May–June, 1890, *E. A. Mearns* 161 (Hb. U.S. 649285 and 649286).

Iowa: Decatur County, pastures and waysides, common, May 28, 1896, *T. J.* and *M. F. L. Fitzpatrick* (Hb. Field 123803).

Missouri: Vulcan, railway tracks, May 8, 1908, *Huron H. Smith* 449 (Hb. Field 240920).

North Dakota: Grand Forks, vicinity of, in 1894, *C. A. Egebretson* 43 (Hb. Chi. 351987).

South Dakota: Mayo, meadows, June 20, 1914, *W. H. Over* 1828 (Hb. U.S. 582845); Rapid City, alt. 3700 ft., June 25, 1892, *Per Axel Rydberg* 846 (Hb. U.S. 211334).

Nebraska: Lincoln, May 10, 1886, *T. A. Williams* (Hb. U.S. 750371).

Kansas: Riley County, grassland, in 1896, *J. B. Norton* 748 (Hb. U.S. 353535).

Alberta: Jasper Park, Cabin Creek near Jasper, roadsides, June 15, 1918, *James M. Macoun* (Hb. Can. no. 98691 in Hb. Field, 483390).

Wyoming: Crow Creek, Albany County, moist banks, July 8, 1903, *Aven Nelson* 8905 (Hb. U.S. 581938); Yellowstone National Park, October 8, 1902, *Edgar A. Mearns* 4769 (Hb. U.S. 488386).

Colorado: Norwood Hill, San Miguel County, moist river banks, alt. 7000 ft., August 17, 1912, *Ernest P. Walker* 488 (Hb. U.S. 544606); Ouray, July 24, 1897, *C. L. Shear* 4102 (Hb. U.S. 858239).

New Mexico: Las Vegas, May 19, 1909, *T. D. A. Cockerell* (Hb. U.S. 660047); Rio Arriba County, hills south of Tierra Amarilla, alt. 2300 m., April 18–May 25, 1911, *W. W. Eggleston* 6545 (Hb. U.S. 660765); Tierra Amarilla, alt. 2280 m., April 18–May 25, 1911, *idem* 6594 (Hb. U.S. 660810); Raton, in streets, alt. 2100–2380 m., June 21–22, 1911, *Paul C. Standley* 6305 (Hb. U.S. 685335); Chama, vicinity of, along river, alt. 2380–2850 m., July 8, 1911, *idem* 6589 (Hb. U.S. 685611).

Utah: Milford, wet ground, June 4, 1902, *Leslie N. Goodding* 1039 (Hb. U.S. 485541); Provo, Wasatch Mts., June 16, 1902, *idem* 1156 (Hb. Field 215750); Big Cottonwood Canyon, below Silver Lake, June 29, 1905, *Rydberg* and *Carlton* 6455 (Hb. U.S. 508591); Wasatch Mts., abundant on plateau east of Ephraim Canyon, alt. 2900 m., August 14, 1907, *Ivar Tidestrom* 230

(Hb. U.S. 506794); Salt Lake City, alt. 5000 ft., May, 1869, *Sereno Watson* 722 (Hb. U.S. 41950).

Idaho: Pine, moist flat lands, August 16, 1910, *J. Francis Macbride* 619 (Hb. U.S. 542442); New Plymouth, "a terrible pest in lawns," July 14, 1910, *idem* 711 (Hb. Field 292597; Hb. U.S. 542478); Nez Perces County, along Hatwai Creek, April 24, 1892, *J. H. Sandberg* 42 (Hb. U.S. 243000); Hailey, common in empty lots, in 1909, *Woods* and *Tidestrom* 2762 (Hb. U.S.).

Nevada: Battle Mt., alt. 1350 m., July 23, 1913, *Albert E. Hitchcock* 626 (Hb. U.S. 765964); Jarbidge, along brook, July 12, 1912, *Nelson* and *Macbride* 2048 (Hb. U.S. 544856).

Alaska: Sitka, June 14-17, 1899, *Coville* and *Kearney* 804 (Hb. U.S. 376697); Wrangell, grassy hillside, May 6, 1915, Mr. and Mrs. *Ernest P. Walker* 617 (Hb. Field 466422); Wrangell, grassy slope, May 8, 1915, *iidem* 631 (Hb. Field 466435).

British Columbia: Oak Bay, vicinity of Sidney, Vancouver Isl., roadsides, April 22, 1913, *John Macoun* (Hb. Can. no. 98700 in Hb. Field, 483380).

Washington: Waitsburg, April 14, 1897, *Robt. M. Horner* 319 (Hb. U.S. 318829).

Oregon: Keno, alt. 4000 ft., May 9, 1898, *Elmer I. Applegate* 2015 (Hb. U.S. 361604); Umatilla National Forest, alt. 4300 ft., June 11, 1912, *C. L. Keithley* (Hb. U.S. 583213); Cottonwood Canyon, Malheur County, alt. 750 m., May 20, 1896, *John B. Leiberg* 2073 (Hb. U.S. 276280).

California: Mt. Shasta, north side of, alt. 5000–10,000 ft., June 15–30, 1897, *H. E. Brown* 442 (Hb. Field 412772); Amador County, March 23, 1896, *George Hansen* 1550 (Hb. Greene 48461).

Chihuahua: Chihuahua, vicinity of, alt. about 1300 m., June 5–10, 1908, *Edward Palmer* 353 (Hb. U.S. 573818).

Coahuila and Nuevo Leon: without locality, February–October, 1880, *idem* 761 (Hb. U.S. 41955).

San Luis Potosi: Alvarez, July 13–23, 1904, *idem* 180 (Hb. U.S. 471047).

Queretaro: Without locality, in 1910–13, *Agniel* 10535 (Hb. Field 484882).

Vera Cruz: Boca del Monte, March 13, 1894, *E. W. Nelson* 226 (Hb. U.S. 252392 *pro parte*); Las Vigas, June, 1893, *idem* 22 sub nomen *Senecio* (Hb. U.S. 252058).

Puebla: Chalchicomula, vicinity of, alt. 8000–8400 ft., March 15, 1894, *idem* 237 (Hb. U.S. 252392 *pro parte*).

Mt. Orizaba: without precise locality, July 25–26, 1901, *Rose* and *Hay* 5722 (Hb. U.S. 395506).

Mt. Popocatepetl: without precise locality, August 7–8, 1901, *iidem* 6067 (Hb. U.S. 395872).

Michoacan: Morelia, in streets, November, 1889, *Alfredo Duges* (Hb. U.S. 41956).

Mexico, civitate non cit.: *Berlandier* 849 (Hb. Boiss., cotype of *T. mexicanum DC.*).

Bermuda Isls.: Flatts, roadsides, August 16, 1913, *F. S. Collins* 314 (Hb. Field 464861); Agar's Isl., "not abundant," December 4, 1915, *idem* 430 (Hb. Field 464906).

Jamaica: Cinchona, alt. 4900 ft., in 1910, *Wm. Harris* 10926 (Hb. Field 294859).

As previously stated, *T. vulgare* tends to pass into *T. ceratophorum* in the northeastern part of North America. The *T. officinale* var. *palustre* of GRAY'S *Manual* (ed. 7, p. 865, *fig. 1015*. 1908) includes some of these transitional forms; so also does *T. latilobum* DC., collected originally in Newfoundland ("invol. squamis ecorniculatis, exter. patulo-reflexis . . . . proxime ad Dentem-leonis accedit," –DC., *loc. cit.*). *Murdoch* 1624, from Massachusetts (Hb. Field 470264) is typical of the GRAY'S *Manual* illustration, and yet is easily recognized as being true *T. vulgare*. *Fernald* and *Collins* 263 (Hb. U.S. 606098) from Quebec has the involucres fairly typical of *T. vulgare*, but in general habit it approaches *T. ceratophorum;* in fact, it was originally under the latter name. *Sornberger* 64*x* (Hb. U.S. 411050) from Labrador is still another form of *T. vulgare*. Its involucres are of the *T. vulgare* kind; but the foliage exactly matches that of *Fernald's* Grand River plant of Quebec (Hb. U.S. 605794), a plant that from involucral characters is seen however to be *T. ceratophorum*. Plants collected by *L. M. Turner* at Davie's Inlet, Labrador (Hb. U.S. 222755), have involucres clearly representing *T. vulgare*, but the foliage is very strange and is closer to that of *T. ceratophorum*, although not typical for that species. It seems entirely probable that a number of these intermediate forms are hybrids.

T. mexicanum DC. is retained as a valid species by HANDEL-MAZZETTI, who had seen at least nine specimens of BERLANDIER'S original type material, but I have seen no specimens of *Taraxacum* from Mexico that were not plainly *T. vulgare*. Even the excellent cotype specimen studied (in Hb. Boiss.) matches much of the *T. vulgare* material of the northern United States in foliage, in fruit, and in involucre. Nor does HANDEL-MAZZETTI'S description indicate any truly distinctive characters. Thus, for example, he describes the cusp of the achenes as being long in *T. mexicanum* and short or very short in *T. vulgare*, but there are numerous

specimens of genuine *T. vulgare* from various points all over North America in which the cusps are very long and slender, fully as much so as in any Mexican material studied by me. DE CANDOLLE himself was in doubt as to the validity of his species, even confessing that it was too close to *T. dens-leonis* (*T. vulgare*) and was perhaps only a variety.[26] HEMSLEY (Biol. Centr. Amer. **2**:261. 1881) regarded *T. mexicanum* as synonymous with our *T. vulgare* (*T. officinale*), and my own observations are in thorough accord with HEMSLEY'S treatment.

T. paradoxum Somes was admittedly a mere freak form of *T. vulgare*, having the stem foliate with alternate leaves, not scapose. The stems were bifurcate at the top. LUNELL'S *T. minus subscaposum* was likewise a mere leafy stemmed form ("caulis unifoliatus"). Such a form was not unknown before (cf. D. MCALPINE Bot. Atlas **1**: *pl. 25, figs. 6, 13b.* 1883).

5. TARAXACUM LAEVIGATUM (Willd.) DC., Cat. Hort. Monspel. 149. 1813; *Leontodon laevigatus* Willd., Sp. Pl. **3**:1546. 1800; *T. erythrospermum* Andrz. in Besser, Enum. Pl. Volhyn., Podol., etc., 75. 1822; *L. erythrospermum* Eichw., Naturhist. Skizze Litth., Volhyn, etc., 150. 1830; *L. erythrospermum* Britton in Britt. and Brown, Ill. Fl. N. Amer. ed. 2., **3**:316. *fig. 4064.* 1913; *T. mexicanum* Wooton and Standley, Fl. New Mex. 626. 1915 (non DC.).

Herba subgracilis, 5–30 cm. alta. Radix tenuiuscula, simplex vel pluriceps, fusce corticata, collo foliorum vetustorum fragmentis persistentibus magnus, plerumque pallide brunneis large squamato, longe lanuginoso vel rarius glabro. Folia terrae adpressa vel suberecta, glabra vel infra parce pilosula, lanceolata 0.5–4 (vel serius etiam −11) cm. lata, versus basim plerumque longe angustata, fere semper tota profunde incisa vel variis modis usque ad nervum medium crebre pinnatisecta, lobis latis angustisve, plerumque acutis, integris vel largius et tenuiter dentatis, plus minusve reflexis, interiectis saepe lobulis dentiformibus, lobo terminali lateralibus paulo maiore vel etiam interdum minore. Scapi singuli vel numerosi, subtenues, erecti vel e basi procumbente adscendentes, floriferi foliis breviores vel longiores, serius plus

[26] "Nimis *T. Denti-leonis affine et forte varietas*," DC., *loc. cit.*

minusve elongati. Capitula parva vel mediocria, circum 1–2 cm. longa et paulo latiora. Involucri foliola utriusque seriei circa 11–13, pallidius atriusve griseo-viridia, glauco-pruinosa, ecorniculata vel plerumque corniculis mediocribus vel parvis instructa. Exterioris seriei foliola adpressa, patentia vel e basi patenti recurva, interioribus latiora eorumque longitudinis tertiam vel dimidiam partem vix superantia, infima ceteris breviora, omnia late vel angustius ovata vel e basi ovata triangularia (4–8 mm. longa et 1.5–3 mm. lata), margine membranaceo plerumque distinctissimo. Flores numerosi, involucro 2–4 mm. longiores, citrini vel (in speciminibus pinguibus) *T. vulgaris* floribus paulo tantum pallidiores, extus plerumque griseo vel rubro striati. Achaenia parva, = 3–4 mm. longa, intense rufa, rufopurpurea vel fere atropurpurea, supra tuberculis longis angustis largis obsita, saepe infra quoque rugulosa, in cuspidem anguste linearem longam, totius fructus tertiam vel quartam partem superantem abrupte contracta. Rostrum tenue, achaenio dimidio vel plus duplo longius. Pappus albus, 4–7 mm. longus.

DISTRIBUTION.—Nova Scotia and Virginia to British Columbia, Idaho, and New Mexico; apparently introduced from Europe, where native, as also (fide Handel-Mazz.) in western Asia and northwestern Africa.

SPECIMENS EXAMINED.—Nova Scotia: Yarmouth, *John Macoun*, June 3, 1910 (Hb. Can. 81358).

Massachusetts: Dorchester, May 24, 1903, *John Murdoch, Jr.*, 1304 (Hb. Field 470218); Weston, May 21, 1904, *idem* 1625 (Hb. Field 470265).

Vermont: Vergennes, dry knolls in orchard, May, 28, 1899, *Ezra Brainerd* (Hb. Greene 48444); West Rutland, Twin Mountains, May 31, 1899, *W. W. Eggleston* 1416 (Hb. U.S. 364398); Shrewsbury, May 25, 1902, *idem* 2681 (Hb. U.S. 492337).

Pennsylvania: Rohrerstown, April 21, 1891, *John K. Small* (2 sheets in Hb. Field, 169751 and 169752); vicinity of Conewago, May 14, 1891, *idem* (Hb. Field 167811).

District of Columbia: Washington, university grounds, May 2, 1899, *Edward L. Greene* (Hb. Greene 48443).

Virginia: North Four Mile Run, May 1898, *Ivar Tidestrom* (Hb. Greene 48441).

Michigan: Durand, May 15, 1913, *Edward L. Greene* (Hb. Greene 22276).

Ohio: Sandusky, July 28, 1903, *E. L. Moseley* (Hb. Field 240265).

Illinois: Chicago, in yard, May 1919, *Winnifred Baantjer* (Hb. Field 485106); Urbana, University campus, April 1, 1907, *Frank C. Gates* "1369.3"

(Hb. U.S. 648981); White Heath (Piatt Co.), ballast of railroad, May 4, 1907, *idem* 1432 (Hb. U.S. 649007); Evanston, near walk, July 4, 1919, *Earl E. Sherff* 3089 (Hb. Field 484466 and 484467).

Missouri: Vicinity of Springfield, pastures, August 28, 1911, *Paul C. Standley* 8287 (Hb. U.S. 687249).

Nebraska: Omaha and vicinity, street, August 16, 1905, *Amy C. Lawton* 65 (Hb. Field 193610).

New Mexico: Chama (Rio Arriba Co.), alt. 2380 m., May 26, 1911, *W. W. Eggleston* 6665 (Hb. U.S. 660876).

Alberta: Athabasca Landing, July 28, 1914, *A. S. Hitchcock* 12158 (Hb. U.S. 885176).

Idaho: Coeur d'Aleur, abundant in lawns at city limits, August 11, 1913, *Henry J. Rust* 396 (Hb. U.S. 870324).

Wyoming: Yellowstone National Park, June 4, 1902, *Edgar A. Mearns* 939 (Hb. U.S. 486330).

British Columbia: Beavermouth, floodplain of Columbia, alt. 2400 ft., August 18, 1905, *C. H. Shaw* 1149 (Hb. U.S. 622044).

This species should not be confused with *T. laevigatum* A. Gray (Proc. Acad. Phil. 1863:70), which was synonymous with *T. lyratum* (Led.) DC. In recent American literature it has been known as *T. erythrospermum*, but HANDEL-MAZZETTI (Monogr. Taraxacum 109. 1907) has seen WILLDENOW'S original specimen of *Leontodon laevigatum* and found that *T. erythrospermum* is purely synonymous with it. BRITTON (*loc. cit.*), familiar only with the name *Taraxacum erythrospermum*, but rejecting the generic name *Taraxacum*, has lately used the name *Leontodon erythrospermum* for this species; but this last combination (made by EICHWALD in 1830) is untenable of course, since under the appellation *Leontodon*, the name *Leontodon laevigatus* antedates it by a number of years. WOOTON and STANDLEY (*loc. cit.*) have confused this species with *T. mexicanum* DC. (*T. vulgare*). From their herbarium determinations and also from their description, "achenes red," it is seen that their plants were purely *T. laevigatum*.

Specifically, *T. laevigatum* is much the most clearly marked and sharply defined of any of our native or introduced North American species of *Taraxacum*.

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EXPLANATION OF PLATES XXXI–XXXIII

PLATE XXXI

Taraxacum lyrat

FIGS. *a* and *j* (×0.48). *T. alaskanum* form: *Coville* and *Kearney* 1097, Haenke Isl., Hb. U.S. 376702; figs. *b* and *f* (×0.48), foliage form typical as to LEDEBOUR'S type illustration, but plants less compound at base than figured by LEDEBOUR, *Coville* and *Kearney* 2164, St. Matthew Isl., Hb. U.S. 376718; figs. *c*, *g*, and *i* (×0.63), showing (*c*) foliage form of *T. lyratum* that corresponds to *T. mutilum* form of *T. ceratophorum* and matches type figures of *T. hyperboreum* Dahlst. and *T. eurylepium* Dahlst., (*g*) foliage form matching VAHL'S type plate of *T. phymatocarpum*, and (*i*) foliage form of *T. lyratum* more nearly approaching that of LEDEBOUR'S plate, all three from *Walpole* 1791, Alaska, Hb. U.S. 378905; fig. *d* (×0.56), from type sheet of *T. alaskanum*, McIlhenny 111, Alaska, Hb. N.Y.; fig. *e* (×0.52), topotype of *T. alaskanum*, Murdoch, Alaska, Hb. U.S. 424063; fig. *h* (×0.70), foliage form closely matching some of more erect "*T. phymatocarpum*" forms from Greenland, *Knowlton* 142, Arizona, Hb. U.S. 41949; fig. *k* (×0.79), tiny dwarf form of Rocky Mts. (*T. officinale* var. *scopulorum* Gray), *Baker, Earle,* and *Tracy* 293, Colorado, Hb. U.S. 76097; fig. *l* (×0.67), from type sheet of *T. rupestre, Macoun*, British Columbia, Hb. Can. 15111.

PLATE XXXII

Taraxacum ceratophorum

FIG. *a* (×0.47),—Type material of *T. mutilum, Glenn*, Alaska, Hb. U.S. 376755; fig. *b* (×0.36), from type sheet of *T. lacerum, Dawson*, northern British-Columbia boundary, Hb. Can. 15119; fig. *c* (×0.44), type plant of *T. leiospermum; Osterhout* 2645, Colorado, Hb. N.Y.; fig. *d* (×0.47), authentic material of *T. Chamissonis*, Cole, St. Paul Isl., Hb. U.S. 376691; fig. *e* (×0.37), from one of type sheets of *T. dumetorum, Greene*, Wyoming, Hb. Green 48431.

PLATE XXXIII

Taraxacum eriophorum

FIG. *a* (×0.64).—From type sheet of *T. eriophorum, Mrs. Fitch*, Montana, Hb. Mont. Agric. Exper. Station; fig. *b* (×0.52) from one of type sheets of *T. angustifolium, Greene*, Wyoming, Hb. Greene 48451; fig. *c* (×0.59), from type sheet of *T. ovinum, Macoun*, Alberta, Hb. Can. 11711; fig. *d* (×0.47), from type sheet of *T. ammophilum, Nelson*, Wyoming, Hb. Greene 48427.